PHILADELPHIA, BALTIMORE & WASHINGTON RAILROAD,
DARBY RIVER BRIDGE
(Pennsylvania Railroad, Darby River Bridge)
Pennsylvania Historic Railroad Bridges Recording Project
Spanning Darby Creek, south of Essington Ave. (State Rt. 291)
Essington
Delaware County
Pennsylvania

HAER No. PA-526

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN ENGINEERING RECORD
National Park Service
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Location:	Spanning Darby River, south of Essington Ave. (State Rt. 291), Essington, Delaware County, Pennsylvania.
USGS Quadrangle:	Bridgeport, Pennsylvania (7.5-minute series).
UTM Coordinates:	18/473175/4412610
Dates of Construction:	1917-18.
Basis for Dating:	Secondary sources.
Designer:	Strauss Bascule Bridge Co. (Chicago).
Fabricator / Builder:	Bethlehem Steel Bridge Corp. (Steelton, Pa.).
Present Owner:	Shared asset between CSX Transportation and Norfolk Southern Railroad.
Present Use:	Railroad bridge.
Structure Types:	Riveted deck girder; riveted girder bascule span.
Significance:	Because Pennsylvania has few low-lying areas, the Darby River Bridge is one of a limited number of movable railroad structures in the state, and even more rare as an overhead-counterweight bascule bridge.
Historian:	Justin M. Spivey, April 2000.
Project Information:	The Historic American Engineering Record (HAER) conducted the Pennsylvania Historic Railroad Bridges Recording Project during 1999 and 2000, under the direction of Eric N. DeLony, Chief. The project was supported by the Consolidated Rail Corporation (Conrail) and a grant from the Pennsylvania Historical and Museum Commission (PHMC). Justin M. Spivey, HAER engineer, researched and wrote the final reports. Preston M. Thayer, historian, Fredericksburg, Virginia, conducted preliminary

research under contract. Jet Lowe, HAER photographer, and Joseph E. B. Elliott, contract photographer, Sellersville, Pennsylvania, produced large-format photographs.

Description and History

In 1916, the Philadelphia, Wilmington & Baltimore Railroad merged with several other lines to form the Philadelphia, Baltimore & Washington Railroad (PB&W). (Before and after the merger, the Pennsylvania Railroad held a controlling interest.[1]) The following year, the PB&W built its Chester & Philadelphia Branch to handle increased traffic from industries along the Delaware River during World War I.[2] The new line largely paralleled the Philadelphia & Reading Railroad's Chester Branch. Both railroads crossed the Darby River on two-track bascule bridges of similar, overhead-counterweight design. These were more than likely designed by the Strauss Bascule Bridge Co. of Chicago, whose founder Joseph B. Strauss developed and patented this type of bascule bridge, among others.[3]

In low-lying areas like the banks of the Darby River near its mouth, movable bridges are useful in carrying land-based traffic across at a low elevation, while opening to let water-borne traffic pass. Bascule spans rotate about a horizontal axis, with a counterweight typically balancing the bascule leaf so that the operating machinery need only overcome friction to move it. While other bascule designs had the counterweight rigidly attached to the tail of the bascule leaf, Strauss' patent claimed a greater efficiency in separating the two components. In all Strauss designs, counterweight and leaf move separately, although restrained by a parallelogram-shaped configuration of hinges called trunnions.[4] A stationary tower forms one vertical side of the parallelogram, with the span rotating about the main trunnion near its base. The tail of the bascule leaf continues past the trunnion — forming the parallelogram's bottom side — to the counterweight trunnion. From the counterweight trunnion, a vertical strut holds the counterweight aloft, forming the second vertical side. An eye-bar link closes the parallelogram across the top. As the span rotates upward, the counterweight remains vertical while descending.

The PB&W's Darby River Bridge has a single bascule leaf of riveted plate-girder construction, which opens to provide a 50'-0" clear channel for navigation on the river. The operating machinery, concrete counterweight, and operator's house are located at the north end of this span. The operating motor, through a series of reduction gears, turns a pinion that engages a segmental rack on the tail of the bascule leaf. Another motor, mounted on the leaf itself, locks the span in the closed position by inserting wedges into the bearings under its free end.[5] When closed, the floor beams are 4'-0" above high water. Five 42'-8"-long deck girder approach spans, two north and three south, make up the bridge's total length of 283'-2". The deck is 26'-0" wide throughout, with walkways on either side. The bridge had a full-time operating staff until 1949.[6]

Notes

1. Howard W. Schotter, *The Growth and Development of the Pennsylvania Railroad Company: A Review of the Charter and Annual Reports of the Pennsylvania Railroad Company 1846 to 1926* (Philadelphia: Press of Allen, Lane, and Scott, 1927), 348; see also Philadelphia, Baltimore & Washington Railroad Co., *Second Annual Report for the Year 1917* (Philadelphia: Press of Allen, Lane & Scott, 1918), 5.

2. Frank G. Tatnall, President, Philadelphia Chapter, Pennsylvania Railroad Technical & Historical Society, to author, 17 Jan. 2000.

3. Symbols indicating two Strauss railroad bascule bridges appear in this area on a map in A. B. Reeve, "The Story of Strauss Bridges," typescript, 1925, collection of Eric N. DeLony. The author does not know of any other railroad bascule bridges in southeastern Pennsylvania.

4. Strauss' first overhead-counterweight bascule bridge, built in 1905, carried the Wheeling & Lake Erie Railroad across the Cuyahoga River in Cleveland; see Otis E. Hovey, *Movable Bridges*, vol. 1, *Superstructure* (New York: John Wiley & Sons, Inc., 1926), 116.

5. "P., B. & W. R. R. Maryland Div., Delaware River Branch, Bascule Bridge over Darby River at Essington, Pa., Sheet C," dated May 1917, milepost 1.67, region/division branch 121246, aperture card files, Consolidated Rail Corp., Philadelphia, Pa. [transferred to Norfolk Southern Railway Co., Atlanta, Ga.; hereinafter cited as Conrail aperture cards].

6. "Erection Diagram, Bridge over Darby River at Essington, Pa., P., B. & W. R. R. Maryland Div., Delaware River Branch, Penn. Co.," dated 8 Nov. 1917, Conrail aperture cards; and milepost 1.67, region/division/branch 121246, correspondence files, Consolidated Rail Corp., Philadelphia, Pa. [transferred to Norfolk Southern Railway Co., Atlanta, Ga.].

Acknowledgment

The author is grateful to Frank G. Tatnall, President of the Philadelphia Chapter of the Pennsylvania Railroad Technical & Historical Society, for responding to a preliminary survey form.